

ABSTRACT

The present invention intends to provide a measurement system capable of measuring a three-dimensional geometry of a target object over a relatively large area, in a small length of time and by a contact-free method. When a ray of light is cast from a light source onto the target object *s* and reflected at a certain point on the surface of the target object *s*, the light produces direct reflection light (zero-order light) and higher-order diffraction light. The zero-order light is guided by a separating optics to a movable reflector of a variable-phase filter 20 while the higher-order diffraction light is guided to a fixed reflector. The two rays of light are reflected by the corresponding reflectors and led to substantially the same point by an interference optics system. At this point, the two rays of light interfere with each other. Under such a condition, when the movable reflector of the variable-phase filter 20 is moved, the strength of the interference light at the imaging point of the interference optics system gradually changes. The position of the movable reflector at the peak point of the interference light depends on the distance between the starting point on the target object *s* and the movable reflector. Therefore, the position of the starting point can be calculated from the position of the movable reflector at the peak point. By performing such a measurement and calculation process on each point of the image of the target object, one can determine the three-dimensional geometry of the object. Moreover, each point can be analyzed by Fourier-transforming the interferogram of that point into a spectrum.